GSMA

The Mobile Economy China 2026

GSMA

The GSMA is a global organisation unifying the mobile ecosystem to discover, develop and deliver innovation foundational to positive business environments and societal change. Our vision is to unlock the full power of connectivity so that people, industry and society thrive. Representing mobile operators and organisations across the mobile ecosystem and adjacent industries, the GSMA delivers for its members across three broad pillars: Connectivity for Good, Industry Services and Solutions, and Outreach. This activity includes advancing policy, tackling today's biggest societal challenges, underpinning the technology and interoperability that make mobile work, and providing the world's largest platform to convene the mobile ecosystem at the MWC and M360 series of events.

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Our team of analysts and experts produce regular thought-leading research reports across a range of industry topics.

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Executive summary

China's mobile sector is entering a new phase. After years of large-scale 5G deployment, China now accounts for more than 40% of global 5G connections, with the number of 5G connections in the region expected to exceed 1.7 billion by 2030. This scale means China is a leader not only in 5G adoption, but also in defining what advanced mobile networks can enable. As coverage and capacity deepen, the focus is shifting from connecting more users to supporting higher-performance, more intelligent and more differentiated services. This transition is marked by the commercialisation of 5G-Advanced across more than 330 mainland cities, which is creating a stronger foundation for mobile AI, immersive consumer services, enterprise digitalisation and more capable public infrastructure.

This transition is reinforcing mobile's wider economic role. Mobile technologies and services in China generated $1.5 trillion in economic value (7.2% of GDP) in 2025, and this is projected to reach $2.1 trillion by 2030. The largest share will come from productivity effects, driven by increasing 5G adoption, AI integration and deeper digital transformation across key sectors. The mobile sector also contributed around $160 billion in fiscal revenues in 2025, while supporting the broader digitalisation of systems, processes and transaction flows that strengthen fiscal capacity across the economy.

Together, these developments are repositioning China's mobile sector from a connectivity enabler to an integrated platform for productivity, innovation and sustainable digital growth. As 5G-Advanced scales up, mobile networks are becoming a stronger platform for real-time AI, enterprise automation and resilient coverage, helping firms improve efficiency, optimise operations and create new service models. Operators are also expanding their environmental role beyond internal efficiency, using distributed infrastructure, storage and intelligent scheduling to better align energy demand with supply and support the decarbonisation of the wider digital economy.

1.7bn

China is expected to exceed 1.7 billion 5G connections by 2030

$1.5tn

In 2025, mobile technologies and services generated $1.5 trillion in economic value (7.2% of GDP), rising to $2.1 trillion by 2030

$160bn

Mobile technologies and services in China contributed $160 billion in public revenues in 2025

Key trends shaping the mobile ecosystem

Mobile AI

Mobile AI-driven traffic is reshaping network-performance requirements

Mobile AI is evolving from device-level intelligence to cross-device, agent-based ecosystems. Spanning personal devices, vehicles and embodied systems, mobile AI is driving new interaction models and service opportunities, supported by advances in on-device AI, edge computing and end-to-end orchestration.

5G-Advanced commercialisation

5G-Advanced covers over 330 cities and has over 10 million users in mainland China

By 2025, five operators across China had launched live 5G-Advanced, while the technology had expanded to cover more than 330 cities and surpassed 10 million users in mainland China. This momentum is moving 5G-Advanced beyond network evolution to service transformation. With super uplink, scenario-based orchestration and integrated sensing moving into commercial use, operators are turning 5G-Advanced into a platform for mobile AI, immersive experiences, industrial intelligence and enhanced urban safety and management systems.

Non-terrestrial networks

There are over 8.2 million D2D users and 26 million connected devices in mainland China

Non-terrestrial networks (NTNs) in China are evolving from emergency connectivity to broader commercial use. Operators are making advances in satellite–terrestrial integration to support more resilient, scalable and ubiquitous connectivity. Early direct-to-device (D2D) services are expanding across devices and scenarios, including wearables, vehicles and IoT. In early 2025, the number of D2D users in mainland China had reached 8.2 million, with over 26 million connected devices.

Policies for growth and innovation

China is shaping the next phase of mobile growth through an evolving spectrum strategy anchored in the upper 6 GHz band, which is now emerging as a core capacity band following its identification for IMT at the World Radiocommunication Conference 2023 (WRC-23). Early momentum, including Hong Kong's 6 GHz auction, signals rising operator confidence as 5G-Advanced and AI-driven, uplink-intensive use cases accelerate demand.

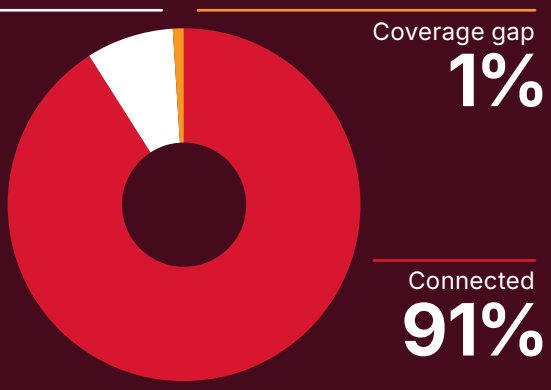
Meeting this growth will require a broader spectrum mix: upper 6 GHz spectrum, alongside future 4.5 GHz and 7–8 GHz bands under WRC-27 consideration, will be important for capacity expansion and 6G evolution, while existing lower bands will remain essential for coverage and service continuity. Proactive planning towards WRC-27 and spectrum roadmaps will be key to sustaining long-term network evolution and economic impact.

The Mobile Economy China

State of mobile internet connectivity

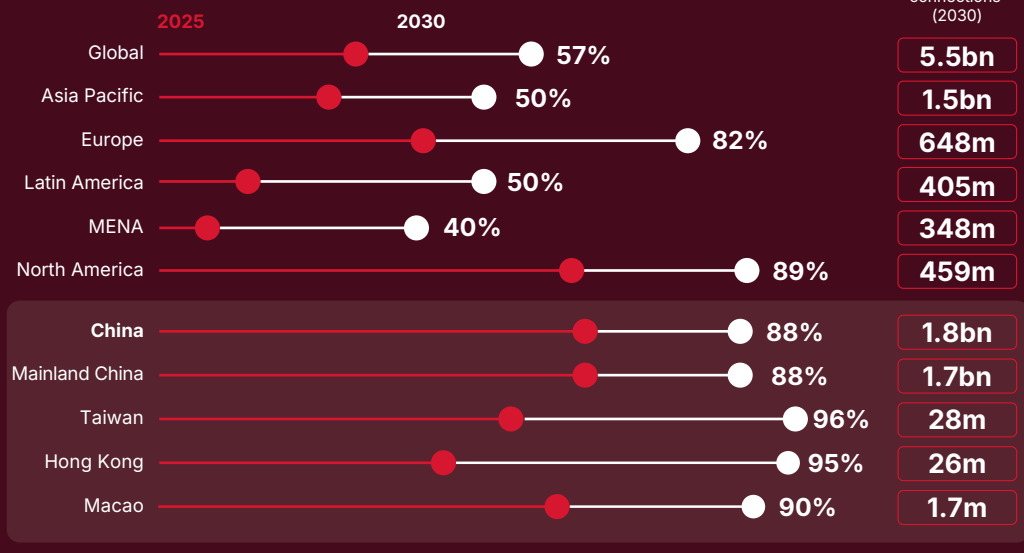
2024

China's sustained investment in digital infrastructure has reduced the coverage gap to around 1%. With 91% of the population now connected to the internet, the remaining challenge is about adoption, as the 8% usage gap needs to be addressed to support more inclusive digital participation.



5G as a share of total connections

Percentage of total connections (2030)



65%

Having reached 65% 5G adoption, China is set to remain among the most advanced regions globally, with Taiwan projected to reach 96% adoption by 2030.

China is expected to account for 1.8 billion 5G connections by 2030, representing more than 30% of the global total.

Operator revenues and investment

Revenues

2025 **$191.0bn**

2030 **$222.8bn**

Investment

Capex for the period 2025–2030

$194.1bn

Operator adoption of GSMA Open Gateway APIs

2025 **8** operators

Representing

26% of China's mobile market share by connections

December 2025

01

The economic impact of the mobile industry

1.1
Macroeconomic outlook

Economic growth in China remained solid in 2025 at 4.7%, well above the global average of 3.1%. Since 2022, growth has moderated as the economy has adjusted to more measured domestic demand, continued adjustment in the property sector and a more complex external environment. While China continues to outperform the global average, the pace of expansion has become more closely linked to policy support and external demand.

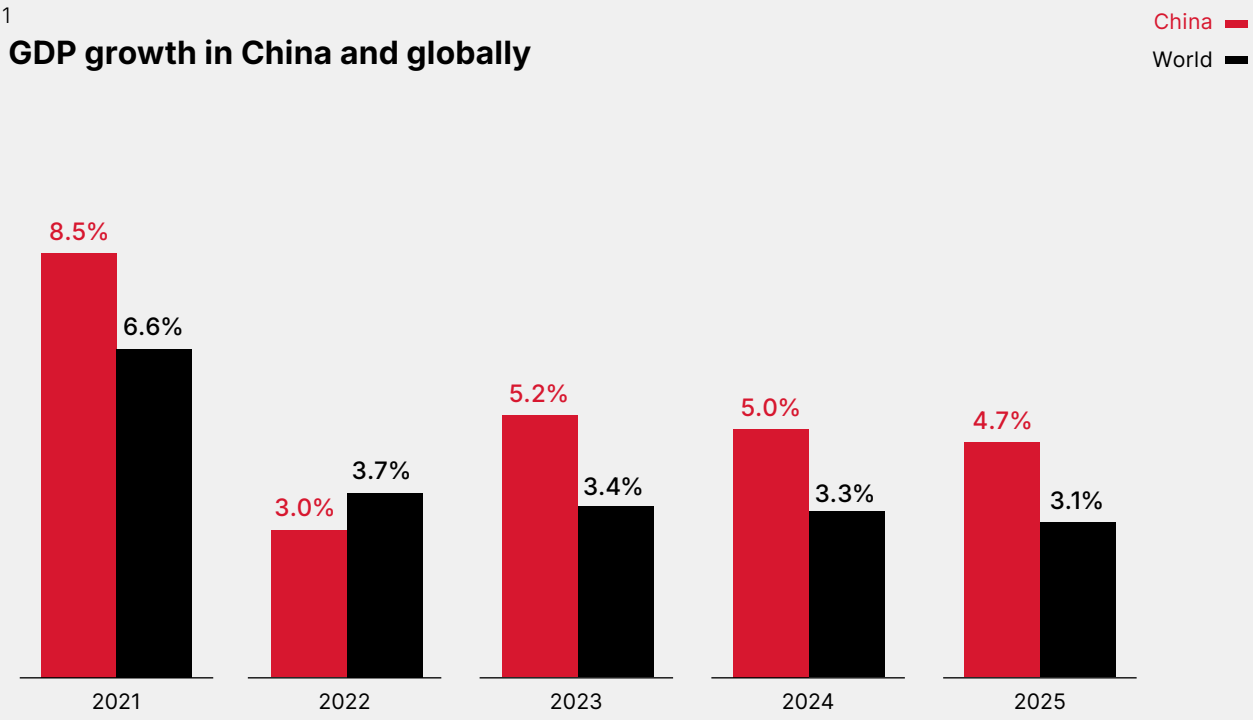
Recent growth has been supported by industrial production, exports and targeted fiscal stimuli, while household consumption has recovered at a more gradual pace. Measures such as the expansion of the trade-in programme, which offers subsidies for the replacement of vehicles, appliances and digital devices, have helped sustain short-term consumer spending. However, consumer confidence remains constrained by property market uncertainty, high precautionary savings and softer income expectations. At the same time, local government debt pressures and more selective private-sector investment continue to weigh on investment, particularly outside strategic sectors.

This highlights the importance of strengthening the foundations for more balanced growth, including stronger social safety nets, higher household incomes and improved confidence in the private sector.

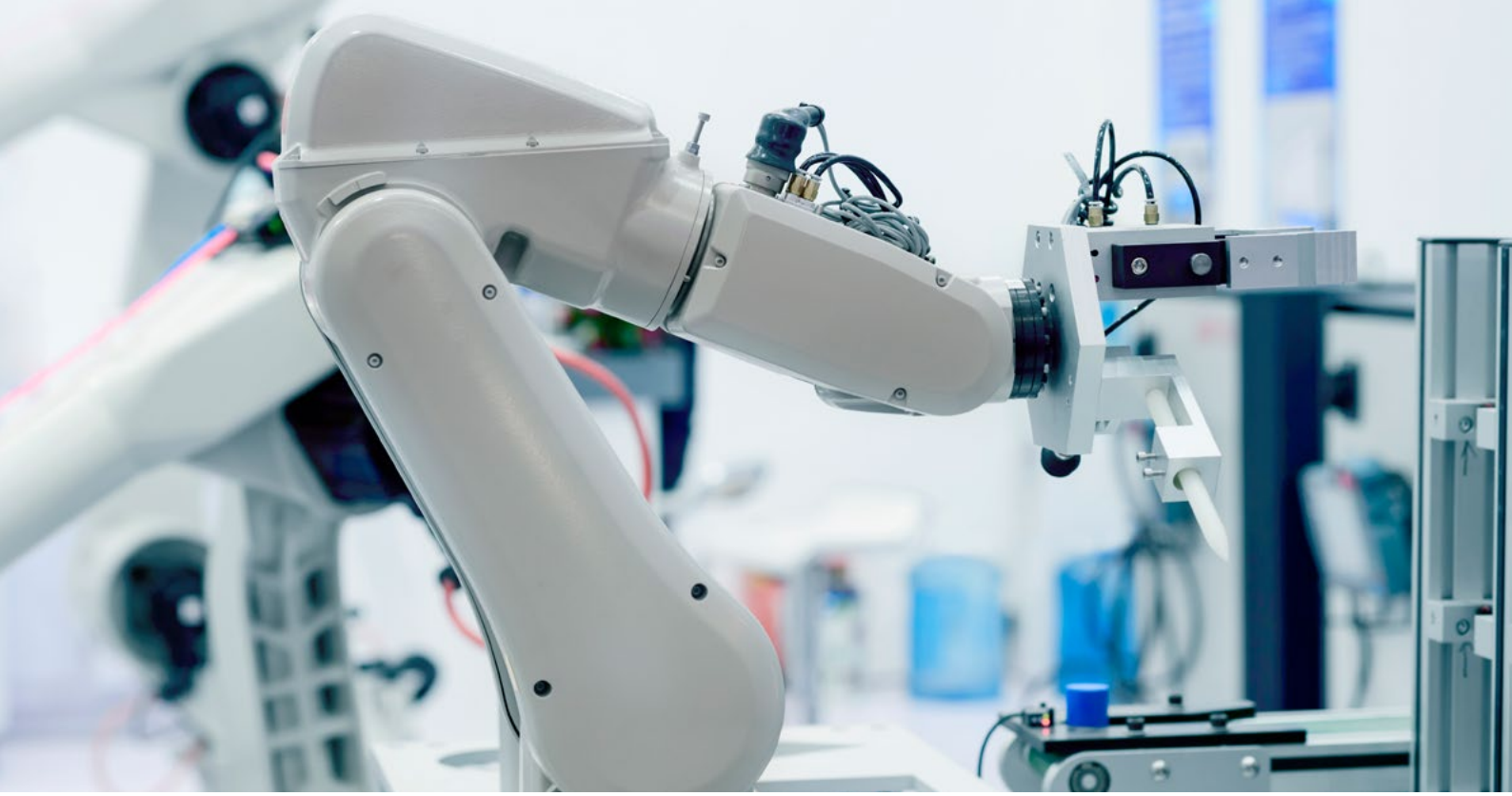
This rebalancing is expected to be a central objective of China's 15th Five-Year Plan (2026–2030), which places greater emphasis on expanding domestic demand, strengthening technological self-reliance and supporting high-quality growth. Alongside continued investment in advanced manufacturing, semiconductors, AI and digital infrastructure, the plan signals a broader shift towards a more consumption-driven growth model. A key challenge will be achieving this transition while maintaining industrial competitiveness and managing rising trade tensions linked to China's large and expanding trade surplus.

Figure 1

Real GDP growth in China and globally



Source: GSMA Intelligence using WEO-IMF October 2025 data



One of China's main macroeconomic challenges is the transition towards more sustainable consumption-led growth. The economy continues to run a large and expanding trade surplus, reflecting the gap between strong productive capacity and subdued domestic demand. While exports have helped stabilise growth, it is increasingly difficult to rely on external demand as a long-term growth engine amid rising trade tensions, tariffs and global concerns over industrial overcapacity. This reinforces the need for stronger household consumption and deeper structural reforms to support more balanced and resilient growth.

Nevertheless, China remains one of the world's leading digital economies, with advanced 5G deployment, strong manufacturing capabilities and significant state-led investment in strategic technologies. These strengths position the region well to capture productivity gains from digital transformation. Continued investment in digital infrastructure, alongside policies that improve innovation capacity and support private-sector confidence, will be critical to sustaining long-run economic growth.

Technology investments underpin economic growth

Technology investments have become essential for sustained long-term economic growth, with digitalisation reshaping how value is created, traded and captured across economies.

In China, investment in digital infrastructure, cloud capacity, semiconductors and AI computing continues to accelerate, reflecting the strategic priority placed on technological self-reliance and industrial upgrading. The government's 'AI+' strategy and the 15th Five-Year Plan (2026–2030) place advanced manufacturing, AI and computing infrastructure at the centre of future growth.

Chinese technology firms such as Alibaba, Tencent and ByteDance are increasing spending on AI infrastructure and cloud services, while demand for domestic AI chips has surged following the expansion of Huawei's Ascend ecosystem and the launch of new large language models such as DeepSeek V4. This reflects a broader shift towards strengthening domestic computing capacity amid tighter US export controls on advanced semiconductors.

Overall, while China continues to navigate macroeconomic challenges linked to more measured domestic demand and a complex external trade environment, it remains exceptionally well positioned to leverage digital investment as a driver of productivity and competitiveness. Realising this potential will depend on sustained investment in advanced connectivity, cloud infrastructure and next-generation technologies, alongside policies that support private-sector confidence, innovation and efficient capital allocation.

1.2
Mobile's contribution to the economy

Mobile technologies contributed $1.5 trillion of economic value in 2025

In 2025, mobile technologies and services generated 7.2% of GDP in China, a contribution that amounted to $1.5 trillion of economic value added. The greatest benefits came from the productivity effects reaching $990 billion, followed by the direct contribution of the mobile ecosystem, which generated $380 billion.

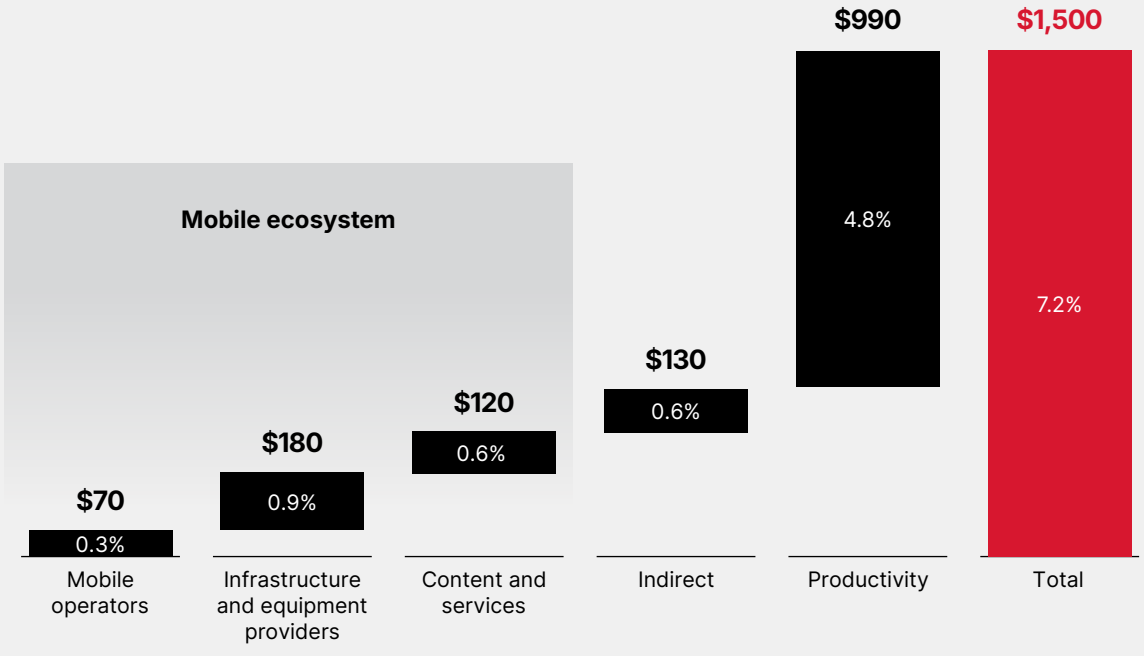
The impacts of mobile technologies include connectivity and digital transformation. Connectivity refers to the use of mobile technologies, while digital transformation involves the integration by enterprises of advanced mobile technologies such as 5G, IoT and AI.

The mobile ecosystem comprises three categories: mobile operators; infrastructure and equipment; and content and services. The infrastructure and equipment category encompasses tower companies, network equipment providers, device manufacturers and IoT suppliers. The content and services category encompasses content, mobile application and service providers, distributors and retailers, and mobile cloud services.

Figure 2

China: economic contribution of mobile, 2025

Billion, percentage of GDP



Note: Totals may not add up due to rounding.
Source: GSMA Intelligence

Mobile's economic contribution will reach $2.1 trillion by 2030

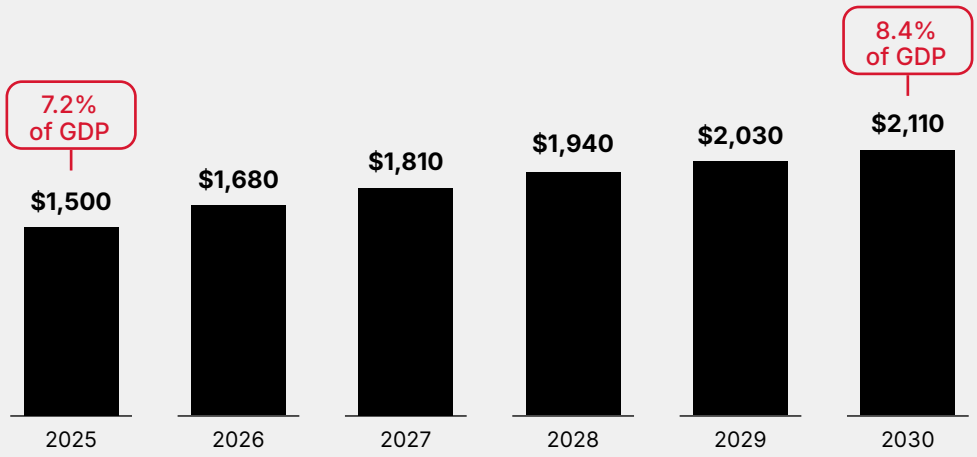
By 2030, mobile's contribution to the Chinese economy will reach $2.1 trillion, driven by the improvements in productivity and efficiency brought about by the continued expansion of mobile services and the growing adoption of digital technologies, including 5G, IoT and AI. By 2030, mobile's contribution is expected to grow at a CAGR of 7.0%, almost twice the overall GDP growth (CAGR of 3.8%).

In this context, mobile technologies play an increasingly important role in supporting economic resilience and competitiveness. By enabling digitalisation across industries, they help firms improve efficiency, optimise costs and adapt to a more challenging economic environment while also supporting innovation and productivity gains over the medium term.

Figure 3

China: economic impact of mobile to 2030

Billion



Source: GSMA Intelligence

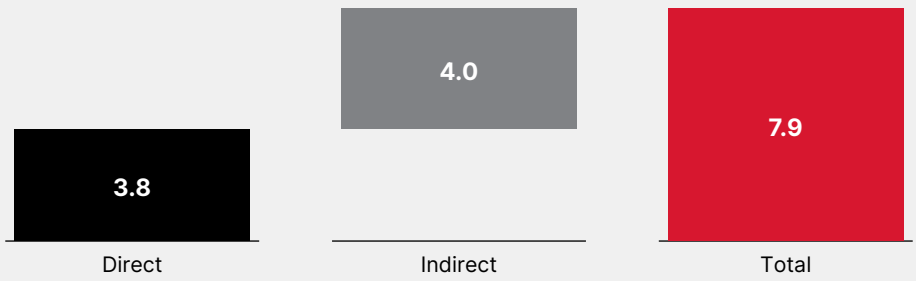
The mobile ecosystem supported nearly 8 million jobs in 2025

Mobile operators and the wider mobile ecosystem provided direct employment to 3.8 million people in China in 2025. In addition, economic activity in the ecosystem generated 4 million jobs in other sectors, meaning that around 7.9 million jobs were directly or indirectly supported.

Figure 4

China: employment impact of mobile, 2025

Jobs (million)



Note: Totals may not add up due to rounding.
Source: GSMA Intelligence

The fiscal contribution of the mobile ecosystem in China reached $160 billion in 2025

Taxes constitute the major share of government revenues around the world. In 2025, tax revenues in China reached $2.7 trillion, or 13% of the regional GDP, similar to the previous year.[1]

The mobile sector in China made a substantial contribution to the funding of the public sector, with $160 billion raised through taxes on the sector in 2025. A large contribution was driven by employment, taxes and social security ($60 billion). The fiscal contribution of the mobile ecosystem represented 5.8% of the total tax revenue.

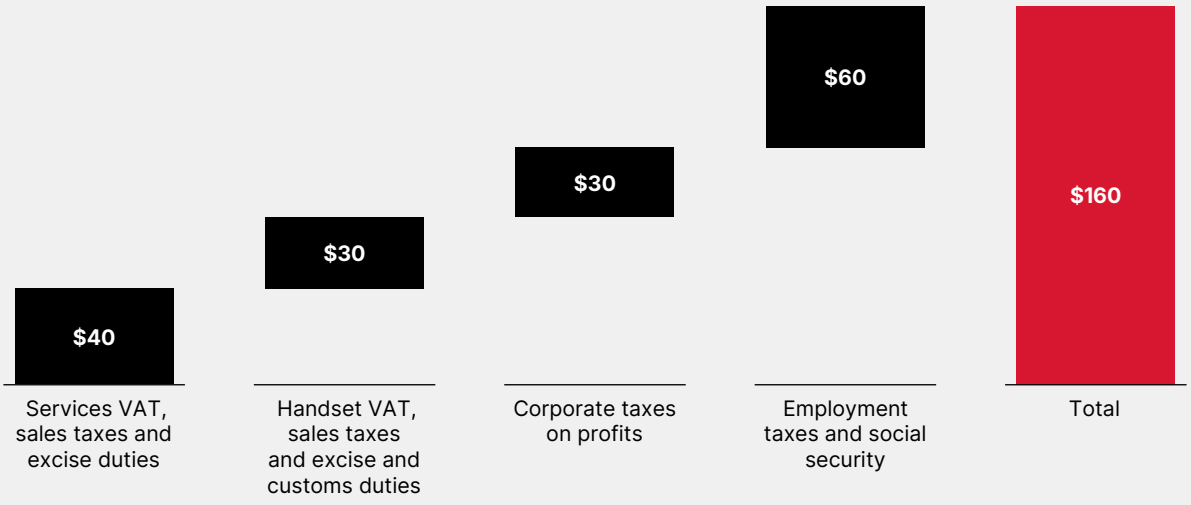
Beyond its direct fiscal contribution, the mobile sector also plays an important role in strengthening public finances in China by supporting the digitalisation of tax administration and the expansion of the broader digital economy. China has made significant progress in digital government services, with mobile connectivity serving as a primary channel for individuals and businesses to access public services, including tax filing, payments and social security administration. Mobile-enabled platforms reduce administrative costs, improve efficiency and help simplify compliance, particularly for small businesses and self-employed workers.

At the same time, China's highly developed digital-payments ecosystem and widespread use of e-commerce platforms enhance transaction traceability and improve tax-collection efficiency, particularly for VAT and consumption-related taxes. Unlike many developing markets where financial inclusion is the primary challenge, China's focus is increasingly on improving the quality and efficiency of tax administration in a large and complex digital economy. Mobile technologies support real-time reporting, digital invoicing and stronger data integration across firms, platforms and tax authorities, helping to reduce underreporting and to narrow compliance gaps. As the digital economy continues to expand, these mechanisms will further broaden the tax base and support more stable and predictable revenue mobilisation, reinforcing fiscal sustainability over the medium term.

Figure 5

China: fiscal contribution of mobile, 2025

Billion



Source: GSMA Intelligence

1. Source: IMF Fiscal Policies: World Revenue Longitudinal Database

The contribution of 5G and its ecosystem

As 5G networks expand and complementary technologies such as AI continue to mature, the scale of impact will be shaped not only by infrastructure availability, but also by investment in digital skills, innovation capacity and the integration of advanced technologies into production processes.

The economic value of digital transformation will come from two main channels:

- **External value creation:** The creation of new revenue streams and business models that expand markets and stimulate additional demand.
- **Internal value enhancement:** Measurable gains in productivity, cost efficiency and operational performance within firms.

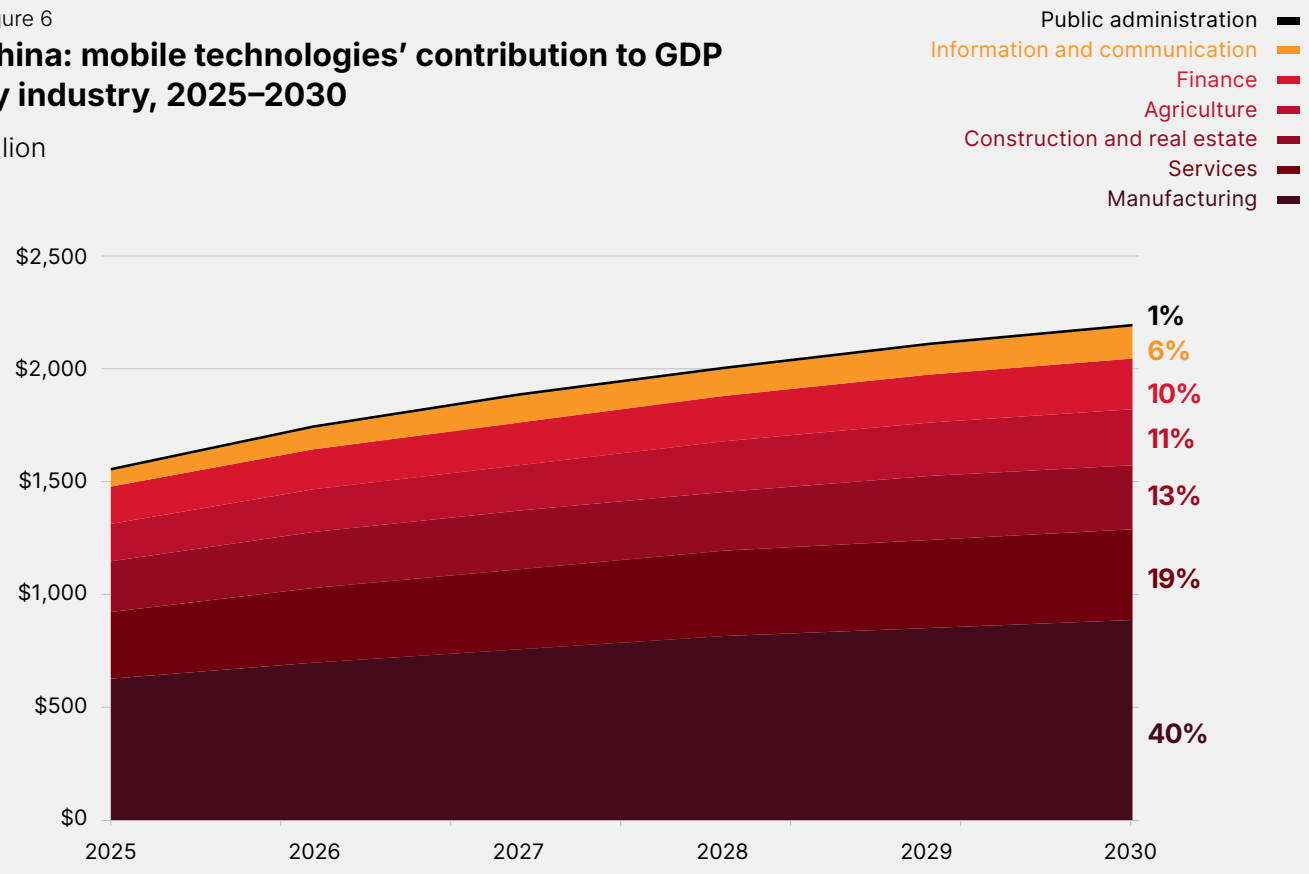
The balance between these channels will vary across sectors, reflecting differences in digital readiness, capital intensity and the ability to adopt and scale up advanced technologies.

Between 2025 and 2030 in China, manufacturing and services are together projected to account for more than half of the incremental economic impact attributable to mobile-enabled technologies. This reflects the central role of industrial production and services in the Chinese economy, as well as their strong capacity to adopt 5G-enabled solutions such as industrial automation, AI-driven analytics, connected devices and smart logistics. Manufacturing remains the largest source of impact, highlighting the importance of advanced connectivity in supporting productivity gains, supply-chain efficiency and industrial upgrading.

Figure 6

China: mobile technologies' contribution to GDP by industry, 2025–2030

Billion



Source: GSMA Intelligence

Construction and real estate, agriculture and finance also make significant contributions, reflecting the broad diffusion of digital technologies across both traditional and high-value sectors. In agriculture, 5G and IoT applications can support precision farming and resource efficiency, while in finance, digital platforms and cloud infrastructure continue to improve service delivery and operational efficiency. The information and communication sector accounts for a relatively modest share of total impact, reinforcing the importance of technology diffusion beyond core digital industries and into the wider economy.

By contrast, public administration represents only a small share of the direct economic impact. This does not imply a limited role for the state in China's economy, but rather reflects the way national accounts classify government activity, with much of the state's influence operating through industrial policy, state-owned enterprises and strategic investment across sectors such as manufacturing, infrastructure and finance. Overall, the distribution of impact points to a broad-based digital transformation, where 5G and its ecosystem support productivity gains across traditional industries while reinforcing China's transition towards a more innovation-driven and technologically self-reliant economy.

02

Trends shaping the mobile industry

2.1
Mobile AI scales across ecosystems

Before the advent of mobile AI, Chinese operators had already built and deployed large-scale AI models, initially for internal use cases such as network optimisation, automation and customer operations, later extending these capabilities to external verticals. Mobile AI does not mark the emergence of AI but a shift in its deployment model. AI is no longer confined to bounded systems and predefined workflows; instead, mobility becomes a defining characteristic, allowing AI to operate across users, devices and contexts in real time. As a result, intelligence is moving beyond isolated agents towards coordinated, user-centric systems, where multiple AI functions embedded across devices and networks interact dynamically around individual intent. This evolution is blurring the boundaries between users, devices and AI systems, laying the foundation for cross-scenario intelligence.

In this context, mobile AI is moving beyond a smartphone-led proposition towards a broader ecosystem of intelligent, mobile and increasingly agentic systems. This shift is being shaped by three emerging modalities:

- **AI-enabled personal devices** involve intelligence extending from smartphones to PCs, smartwatches, smart glasses, earbuds and other wearables, broadening the range of user-facing AI entry points.
- **AI-enabled mobility carriers** cover not only intelligent road vehicles such as cars and buses, but also mobile platforms in adjacent domains, including drones and autonomous vessels.
- **Embodied intelligence** brings AI into physical agents capable of sensing, interacting with and acting on the real world.

Collectively, these modalities suggest that mobile AI is no longer confined to a single device category, but is developing into a broader agentic ecosystem with more diverse connectivity scenarios, richer modes of interaction and increasingly demanding network requirements.

Mobile AI is evolving into cross-device agent ecosystems

The first mobile AI modality is emerging around agent-enabled devices, where AI capabilities are embedded into smartphones, PCs, customer-premises equipment (CPE), wearables and voice interfaces. Rather than acting as standalone assistants, these devices are becoming coordinated entry points for cross-app orchestration, contextual services and cloud-edge intelligence across consumer and enterprise scenarios:

- **AI smartphones and PCs as cross-device agent platforms:** Operators in mainland China have begun extending AI handsets beyond device-level assistance towards a broader agent layer that spans smartphones and PCs. China Mobile has positioned its Lingxi 2.0 agent model around cross-app orchestration across communications, travel, lifestyle services and content, while its AI PC applies similar capabilities to productivity tasks. China Telecom took a comparable approach with its Xingxiaochen mobile agent on the Maimang 40 smartphone model, combining AI calling, office assistance and everyday services.
- **AI CPE and connected gateways as cloud-edge nodes:** China Unicom's AI+eSIM Cloud-Intelligent Terminal Cooperation Initiative, launched with the GSMA at MWC Barcelona 2026, combines AI devices, eSIM connectivity, cloud–edge coordination and ecosystem partnerships. Its first 5G AI CPE unit enables plug-and-play global connectivity and edge-side AI inference for enterprise networking, retail operation, industrial IoT and video analytics, supporting replicable AI terminal solutions for cross-border and vertical-market deployment.
- **Voice and calling as a trusted AI service layer:** Voice is becoming an increasingly important operator-led AI layer, building on operators' established role in communications. China Telecom's Xingxiaochen mobile agent model integrates AI calling functions such as real-time fraud alerts, call summaries and AI answering, while China Mobile highlighted 5G new calling services, including real-time transcription, in-call translation and an AI health assistant for appointment booking. Together, these developments point to a broader effort to make voice a more intelligent, trusted and service-oriented interface.
- **Wearables for more contextual and accessible AI services:** AI wearables are increasingly focused on practical assistance in real-world settings, moving beyond immersive display concepts. China Telecom's Tianyi AI Smart Glasses, launched in July 2025, supports translation, image recognition, guided explanation and information look-up. Its deployment on cruises in Shanghai also demonstrated a clear tourism use case. China Mobile similarly showcased Lingxi-enabled wearables focused on translation, navigation and multimodal interaction, indicating growing emphasis on hands-free, context-aware AI support.

China's AI wearables market has become more active since late 2025, with other players, beyond operators, using smart glasses to extend AI assistants into everyday mobile scenarios. Two trends are emerging. Internet platforms are turning wearables into service and transaction interfaces, and device and mobility players are using wearables as extensions of broader hardware ecosystems:

- **Internet-platform wearables:** Alibaba's Qwen-powered Quark AI glasses and Baidu's Xiaodu AI Glasses Pro show how internet platforms are extending AI assistants from apps into wearable interfaces, linking translation, visual recognition, information capture and service interactions to wider search, commerce, payment and local-services ecosystems.
- **Device-ecosystem wearables:** Xiaomi, Li Auto and Lenovo point to a device-led route for AI wearables. Xiaomi's AI glasses act as a hands-free extension of its smartphone and smart-home ecosystem, supporting translation, payments and first-person video. Li Auto's Livis AI glasses extend its in-car AI assistant to the wider mobility journey through vehicle access, information display and voice-based vehicle control. Lenovo's Qira-powered AI Glasses Concept, introduced in January 2026, uses the glasses as a wearable interface within Lenovo's wider PC–smartphone ecosystem, supporting live translation, image recognition, optical character recognition (OCR) and task assistance across work and daily use scenarios.

Vehicles are becoming cross-domain mobile AI hubs

The second mobile AI modality – AI-enabled mobility carriers – is emerging through agentic mobility platforms, with connected cars being the clearest example. Here, the vehicle is evolving beyond an AI endpoint into a smart home on wheels and a persistent AI service hub integrated with the broader digital and domestic service environment. China Unicom's platform reflects this shift: rather than focusing only on connectivity, it provides Chinese automakers expanding overseas with a cloud-network-enabled intelligent cockpit platform. Other mobility segments, such as drone applications, remain at an earlier stage, with AI mainly supporting coordination, remote control, inspection and logistics. Over time, operators are expected to extend this model to additional transport domains as enabling technologies and operating models mature.

China Mobile and Deepal: defining an integrated AI ecosystem across the user, vehicle and home

China Mobile and Deepal (under ChangAn Automobile) jointly launched an initiative to explore cross-domain integration between connectivity, AI and smart mobility. The collaboration combines China Mobile's network, user identity and AI capabilities with Deepal's intelligent cockpit, aiming to build a unified 'user–vehicle–home' service ecosystem.

Device roles

Smartphone: The main user interface for authentication and control, enabling access to car and home functions through the user account and SIM-based digital key capability.

Vehicle: The primary AI interaction hub, enabling multimodal understanding and cross-device task orchestration.

Home devices: The execution layer for automated home actions, with some also functioning as standalone mobile AI devices.

Solution

The smartphone serves as the user entry point, with China Mobile's Lingxi voice agent supporting task initiation, while the cockpit AI agent, based on the Jiutian multimodal model, coordinates interactions across the car, phone and home. In the car, it draws on smartphone apps and data to support personalised entertainment and service access. Across home scenarios, it links with smart devices to trigger actions such as switching on lighting, air conditioning or water heating before arrival, or turning off selected devices when the user leaves.

Impact

The solution turns the car from a connected endpoint into a cross-domain AI service hub. It strengthens service continuity across mobility and home environments, deepens user stickiness and gives operators a clearer path to monetise integrated AI services beyond basic connectivity.

Embodied AI shaping a new layer of physical service delivery

The third mobile AI modality – embodied intelligence – is starting to integrate with selected human activities in physical environments, with activity from both operators and specialist robotics companies, although the field is still nascent across both consumer and enterprise markets.

On the consumer side, progress is centred primarily on emotionally responsive interaction and companion-oriented use cases within domestic settings:

- China Telecom has an AI companion robot for elder care, while its Meihao Home robot lab, launched in June 2025, signals longer-term ambitions around more general household assistance.
- Fourier's GR-3 humanoid robot, launched in August 2025, integrates vision, audio and tactile feedback to enable more natural emotional interaction, supporting the case for embodied AI in companionship, care and assisted-living use cases.
- Unitree's R1 humanoid AI, launched in July 2025 at CNY39,900 ($5,900), points to progress towards more affordable general-purpose humanoid hardware, being priced well below its 2024 G1 model at CNY99,000 ($14,600). This is helping to broaden access for developers, education and early consumer experimentation.

In enterprise settings, the value proposition is more immediate and task-led, strengthening embodied AI as a tool for automating repetitive, labour-intensive or safety-sensitive physical tasks:

- China Mobile's unmanned restaurant at MWC Barcelona 2026 showed how embodied AI could support smarter retail operations through multi-robot coordination across ordering, preparation and delivery.
- China Unicom's demonstration of its Gewu Xiaozhi robots in hazardous-chemical scenarios in July 2025 point to a more critical role for embodied AI in inspection, diagnosis and response workflows in safety-sensitive operations.
- Ubtech's Walker S2, launched in July 2025, is being positioned for smart manufacturing tasks such as handling, assembly and human–robot collaboration, with Airbus already acquiring the robot in January 2026 for early testing in aviation manufacturing.
- Galbot placed its G1 embodied AI robot into regular retail operations starting in April 2026, where it helps with greetings, product enquiries, promotion guidance, goods retrieval and delivery, coffee preparation and collaboration with store staff.

Beyond individual robot products, operators and robotics companies are also beginning to define stronger commercial models for embodied AI. In March 2026, AgiBot announced that the production of its general-purpose embodied robots had reached 10,000 units, highlighting progress from prototype development towards larger-scale manufacturing and delivery. Building on this scaling capacity, the company has introduced seven standardised robotics solutions to support deployment across production lines, logistics systems, commercial spaces and other industry scenarios. In parallel, both AgiBot and China Telecom introduced robotics as a service last year, repositioning robotics as a cloud-based, on-demand service for sectors such as airports, logistics and smart campuses, with clearer scope for recurring revenue and longer-term service monetisation.

Device, edge and orchestration capabilities underpin mobile AI at scale

Mobile AI rests on a broader set of advances in network capability, intelligent connectivity and AI system architecture, all of which are making real-time, multimodal and mobile interaction more feasible. Within this wider foundation, three capabilities are particularly important to the practical delivery of mobile AI: bringing intelligence closer to users; extending low-latency compute into the network; and coordinating workloads across device, edge and cloud environments.

On-device AI is enabling real-time and context-aware interaction

Driven by the need for real-time, context-aware interaction closer to the user, on-device models are the first enabler of mobile AI, as they offer more resilient handling of lightweight tasks, with reduced latency and less dependence on network conditions. Operators are further reinforcing this layer by expanding on terminal-side models, including China Mobile's Lingxi, China Telecom's Xingxiaocheng and China Unicom's Yuanjing. China Telecom's Xingchen Agent Service Platform 1.0 points to a more integrated agent approach, linking terminal-side AI capabilities with service orchestration across multiple devices. This allows a broader range of AI tasks to be handled directly on smartphones and other intelligent terminals at the point of use.

Edge computing is enabling low-latency and distributed AI execution

While lightweight tasks can be handled by on-device AI, operator-led AI applications also require increasingly complex multimodal processing, video analytics and real-time decision making, as evidenced by a large number of applications in recent years across industry, transport and security. Chinese operators are therefore moving beyond siloed, project-specific deployments to densify more standardised and reusable edge infrastructure, including city-level multi-access edge computing (MEC) and access-side nodes. In its annual results released in 2026, China Telecom reported more than 3,000 edge compute nodes at the end 2025.

Chinese operators are also moving compute closer to the radio layer through AI-RAN. While existing edge nodes underpin local inference and low-latency enterprise services, AI-native RAN allows tighter coupling with wireless resources, supporting real-time scenarios such as robotics, vehicle-road coordination, low-altitude sensing, industrial control and extended reality (XR). It also opens new pathways to monetise RAN-side compute for operators.

While architectures remain at an exploratory stage, progress is being made. In 2025, China Mobile and AsiaInfo launched an AI-native RAN base-station solution based on cloud-integrated sensing RAN, enabling dynamic sharing of communication, sensing and compute resources. China Telecom has demonstrated an AI-RAN framework that schedules intrinsic RAN compute at the edge to support real-time AI inference, validated in a robotic guide-dog use case with navigation, obstacle avoidance and multimodal interaction. In parallel, Chunghwa Telecom's partnerships with Nokia and Ericsson at MWC Barcelona 2026 signal continued momentum in advancing AI-RAN and autonomous network capabilities.

End-to-end orchestration is enabling unified mobile AI execution

Mobile AI maturity will eventually depend on the coordinated use of distributed compute. With AI workloads spread across the device, edge and cloud, orchestration becomes critical to determine where tasks should run, simultaneously balancing latency, compute requirements, data sensitivity, cost and network conditions.

Chinese operators are advancing this capability. China Telecom devised the intelligent ubiquitous cloud, which promotes integrated deployment from central cloud to edge and device, enabling flexible AI inference placement. China Mobile upgraded its Computing Network Brain 3.0 in 2025, introducing a multi-agent architecture to coordinate resources and automate task orchestration across complex compute-network environments. This platform is closely integrated with its Jiutian AI model portfolio, enabling coordinated deployment and scaling of large, medium and small models across cloud, edge and device environments. Building on this, China Mobile's 2026 collaboration with ZTE extended this orchestration logic towards cross-data-centre coordination. At MWC Barcelona 2026, the two companies launched Scale-Across, based on GSE-DCI, to improve long-distance interconnection, resource utilisation and stability across distributed AI compute clusters.

Together, these developments underpin a shift towards unified orchestration platforms, allowing operators to support diverse mobile AI applications while evolving from infrastructure providers to integrated, platform-based service enablers with more scalable and recurring value creation.

2.2
5G-Advanced commercialisation takes shape across multiple fronts

By 2025, China had become one of the most active 5G-Advanced markets, with commercial launches by China Mobile, China Telecom and China Unicom in mainland China, CTM in Macao and HKT in Hong Kong. All three mobile operators in Taiwan have announced plans for 5G-Advanced. These launches are significant given China's large share of early live 5G-Advanced networks worldwide. Momentum has continued into 2026: China Telecom Shanghai announced China's first commercial '5G-Advanced × AI massive-uplink network', with over 5,000 upgraded sites, 1 Gbps peak uplink and continuous 20 Mbps uplink coverage in key core-urban scenarios.[2]

Commercialisation is also moving beyond speed upgrades. Operators are using 5G-Advanced for scenario-based premium services across stadia, tourism sites, transport hubs and live events, combining uplink enhancement, capacity expansion, differentiated packages and fan-experience monetisation. By the end of 2025, 5G-Advanced coverage in mainland China had extended to more than 330 cities,[3] while the number of users had surpassed 10 million by the middle of 2025.[4] Together, these developments position 5G-Advanced as a foundational layer for differentiated connectivity, richer digital experiences and broader digital-service innovation.

Super uplink as a core 5G-Advanced capability for emerging traffic demand

The rise of mobile AI in China is sharpening the strategic importance of uplink performance within 5G-Advanced. New traffic patterns are being shaped not only by live streaming and short-form video, but increasingly by multimodal AI assistants, AI wearables, XR devices, connected vehicles and embodied-intelligence applications – all of which require more continuous uplink capacity, lower latency and stronger performance consistency than earlier mobile services. In China, this shift has started to be framed explicitly around super uplink evolution. China Mobile and the GSMA jointly launched the GigaUplink initiative at MWC Barcelona 2026, which identified ubiquitous 20 Mbps uplink and 1 Gbps peak uplink as key network targets for the mobile AI era.[5]

In the consumer market, the near-term role of super uplink is to enhance the consistency and usability of uplink-intensive experiences. Its main value lies in supporting smoother live broadcasting, faster video uploading and more responsive real-time interaction, particularly under high-traffic conditions, where uplink constraints are most acute. This is beginning to feed into commercial packaging.

For example, at the 2026 Beijing E-Town Half Marathon, China Unicom and Huawei reported uplink fulfilment above 20 Mbps for 99.6% of the time and a field-tested uplink peak of 677 Mbps, supporting 4K/8K broadcasting, real-time editing and large-scale user uploads in a high-concurrency environment.[6] Alongside scenario-based deployment, China Unicom has also incorporated uplink performance tiers up to 300 Mbps into its 5G-Advanced cloud-intelligence service packages, bundling connectivity with cloud and device offerings.

Deployment in the enterprise segment presents an even more direct link between uplink capability and application feasibility at scale, as many industrial use cases rely on continuous, high-quality data return for real-time analysis and decision making. Super uplink supports HD video uplink, machine vision and remote inspection, forming a critical enabler for production workflows. For example, China Unicom Guangdong, Gree and Huawei deployed a 5G-Advanced native private network at Gree's Gaolan factory in Zhuhai in 2025, combining AI models with high-uplink, low-latency connectivity to support real-time production and quality inspection. In Huawei's 2025 annual report, it revealed the industrial inspection scenarios achieved defect-detection rates of up to 99.5%.

2. "China Telecom Shanghai has built the nation's first commercial 5G-A x AI uplink network", China Telecom, March 2026
3. "China's 5G base stations top 4.83 million by end of 2025", The State Council of the People's Republic of China, January 2026
4. "Huawei Showcases 5G-A Development and Value of Scenario-based AI", Huawei, June 2025
5. "GSMA launches GigaUplink network initiative jointly with Huawei and other industry partners", Mobile World Live, March 2026
6. "China Unicom Beijing, Huawei Deploy High-Uplink 5G-A Network Powers at Beijing Marathon", Huawei, November 2025

Adapting to diverse traffic patterns

A defining feature of the next phase of the 5G era in China is not only growth in connection volumes but a diversification of connected forms. Connectivity now spans wearables, industrial cameras, vehicles, drones and tagged assets across consumer, enterprise and public environments. Each category has different network requirements: wearables and asset trackers prioritise low power consumption and cost efficiency; industrial cameras and machine-vision systems require sustained uplink capacity; and connected vehicles and drones depend on mobility, low latency and reliability. This is broadening the definition of 'user device' within a more diverse connected ecosystem.

This is driving operators towards more dynamic, scenario-based resource allocation under 5G-Advanced, moving beyond uniform best-effort delivery:

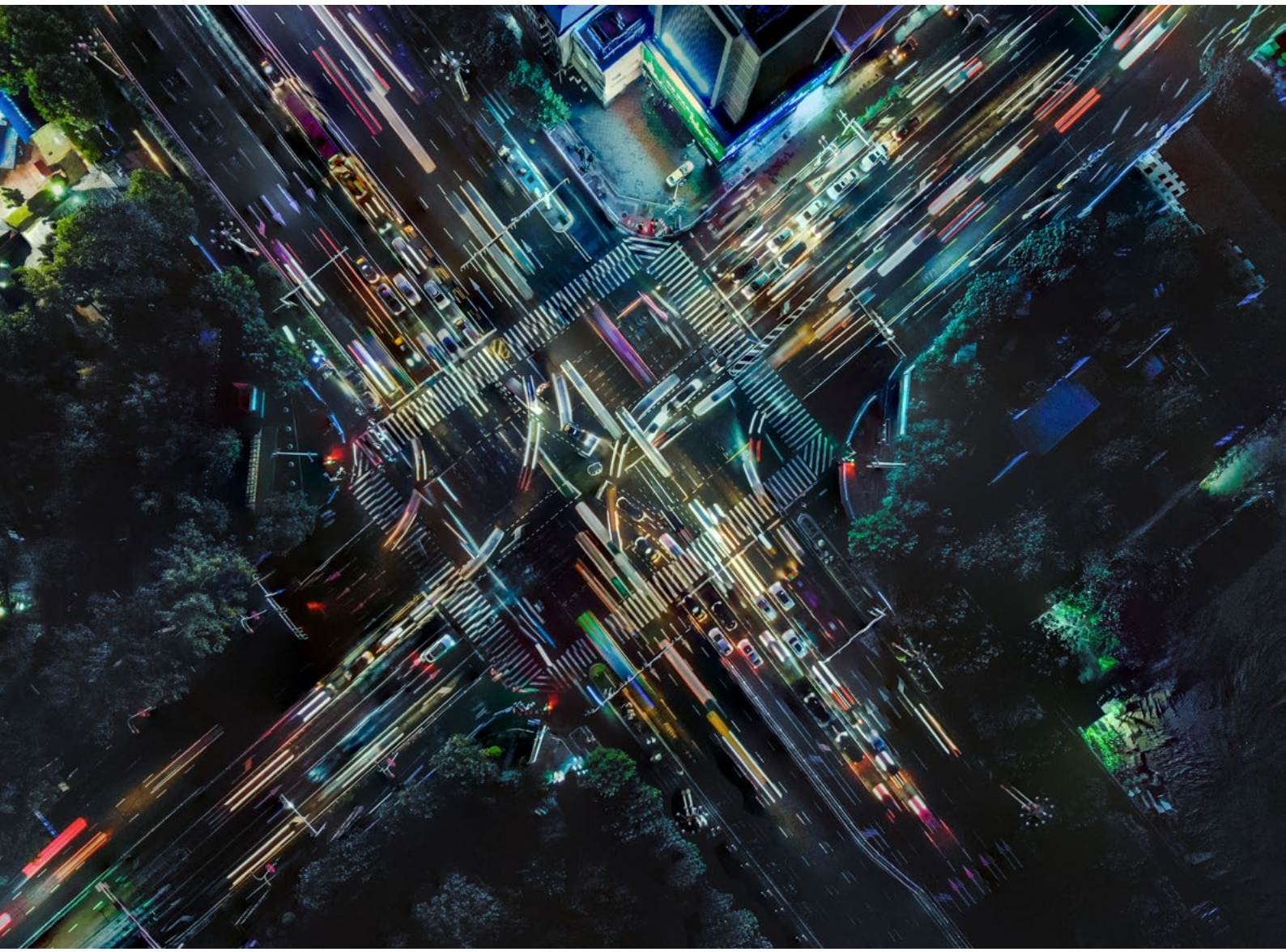
- **China Mobile** has commercialised differentiated assurance through premium 5G-Advanced packages, such as its June 2025 Shanghai Shenhua football team fan package for high-density event scenarios.
- **China Telecom** and **China Unicom**, through their shared-network 5G-Advanced innovation and co-governance framework, are advancing more granular orchestration of network resources across shared infrastructure to match service requirements.
- **China Telecom**, alongside ZTE, released its Differentiation-driven Generative Network solution, extending the two companies' earlier User-driven Generative Network concept by enabling more fine-grained, AI-driven allocation of network resources across users and scenarios. This supports more differentiated and, in selected cases, more deterministic connectivity.

Within this broader diversification, a notable connectivity tier is the connection of more constrained, long-duration devices. In mainland China, commercialisation of this segment has already begun: by 2025, all three major operators had begun 5G RedCap commercial deployment. 5G-Advanced builds on this foundation by pushing cellular connectivity further towards lighter, lower-power and more energy-constrained device categories. It also opens a path towards ambient IoT through a low-power wake-up mechanism and network architecture suited to ultra-light devices. In March 2026, China Telecom completed commercial verification of 5G-Advanced ultra-lightweight end-to-network interoperability. Overall, this points to a more differentiated and efficient connectivity model in China empowered by 5G-Advanced.

Integrating sensing for public safety

As connectivity becomes more differentiated and mobile AI moves from digital assistance to physical-world coordination, China's dense urban environments are creating new requirements for network intelligence. By 2024, mainland China had more than 2 million registered unmanned aerial vehicles (UAVs), over 26 million annual flight hours and peaks of 26,000 UAVs simultaneously airborne,[7] while autonomous-driving activity was also expanding through a rising base of licensed test vehicles. In this context, connectivity alone is no longer sufficient. The increasing presence of drones, vehicles and other automated systems is adding to the complexity of movement and safety management across shared urban environments, increasing the need for networks that can sense, interpret and respond to real-world conditions more effectively.

5G-Advanced introduces integrated sensing and communication (ISAC), enabling networks to detect and track objects while maintaining connectivity. In China, this is already moving to practical deployment. At MWC Barcelona 2026, China Mobile showcased its 'four-code-in-one' UAV supervision system, based on 5G/5G-Advanced and its Lingyun platform, to support trusted UAV identification, airspace monitoring and safety control. China Telecom also demonstrated an AI-based drone-mitigation platform already in place for low-altitude management in over 60 cities, combining 5G-Advanced, RedCap, mmWave sensing and ISAC to support safer, more manageable public-space operations. These developments mark a shift in China's networks from passive connectivity platforms to more active coordination layers, as they take on a growing role in safeguarding public spaces.



7. "CAAC Releases Two Mandatory National Standards for UAV", Civil Aviation Administration of China, December 2025

2.3
Non-terrestrial networks expand service boundaries

China's satellite communications ecosystem initially evolved around narrowband services based on geostationary Earth orbit (GEO), positioned as a resilience layer for terrestrial networks. China Telecom's Tiantong-1 service began civil use in January 2020 through dedicated satellite handsets, mainly for emergency communications in extreme environments. In September 2023, China Telecom commercialised satellite direct to device (D2D) for mass-market smartphones, supporting two-way voice and SMS, marking an early consumer model for satellite services in China. This meant access shifted from specialised terminals to ordinary SIM-based mobile devices. In 2024, the service expanded to Hong Kong through SmarTone, 3HK and HKT, while China Telecom also advanced vehicle direct-connect services in mainland China. By 2025, China Telecom had 8.2 million D2D users and over 26 million connected devices.[8] The Ministry of Industry and Information Technology (MIIT) in mainland China approved China Mobile's and China Unicom's launch of D2D services in 2025, signalling a transition from early adoption to a broader non-terrestrial network (NTN) commercialisation phase.

From legacy satellite systems to emerging NTN connectivity

Satellite services in China currently rely on GEO systems, notably the Tiantong satellite system for voice and SMS and the BeiDou Navigation Satellite System for ultra-narrowband messaging, supported on over 40 cellphone models. Although they offer wide coverage, GEO links remain constrained by limited bandwidth and high latency. Since the commercialisation of D2D at the end 2025, operators have focused on extending service capabilities within these limits.

In November 2025, China Mobile introduced multimedia enhancements to BeiDou messaging, enabling short text, eight-second voice clips and compressed image transfers of up to 200 MB using AI-based compression and reconstruction. Similarly, China Telecom enabled limited image transfers and instant messaging for selected devices in sectors such as emergency response and maritime operations. Though constrained to specific scenarios, these features improve mission-critical communication by enabling richer situational awareness where voice is impractical.

At MWC Barcelona 2026, China Telecom also demonstrated image and voice transmission over a 2.8 kbps satellite link using DCM semantic coding and decoding technology, a compression approach that preserves task-relevant semantic information under very low bandwidth. This approach points to a potential technical pathway for overcoming narrowband constraints and enabling richer future NTN data services.

Satellite connectivity, including D2D services, also gained momentum in Taiwan in 2025. Operators and public-sector agencies pursued an active partnership strategy across low Earth orbit (LEO), medium Earth orbit (MEO) and GEO systems, laying the groundwork for multi-layer NTN connectivity. While mass-market retail services have yet to launch, these moves point to a clear shift from trials to capacity-building for resilient broadband, enterprise back-up and future D2D services. Below are recent key developments in this area:

- **LEO:** Taiwan Mobile completed LEO direct-to-consumer (D2C) voice and connectivity verification with Lynk Global in November 2024. In June 2025, Chunghwa Telecom obtained Taiwan's first commercial licence for Eutelsat OneWeb–based LEO satellite services, strengthening its satellite connectivity portfolio for enterprise communications and network redundancy.
- **MEO:** In November 2025, Chunghwa Telecom gained approval to use SES O3b MEO capacity, adding a complementary layer for cross-border connectivity and enterprise back-up circuits.
- **GEO:** In April 2025, Chunghwa Telecom and Astranis agreed to deploy Taiwan's first dedicated GEO communications satellite, with initial operations expected as early as 2026 for government, enterprise-broadband and resilience services.

8. China Telecom Annual Report 2025

Widening the service frontier beyond smartphones

China's NTN development is extending beyond smartphones to a broader range of devices and scenarios. In January 2026, China Telecom's satellite-communications subsidiary launched the X1 Tiantong wearable satellite communicator with 318 Sports, targeting off-grid environments such as remote mountains and maritime zones, supporting satellite calling and one-touch emergency location sharing. At MWC Barcelona 2026, China Telecom and Huawei also showcased enhanced handset designs using advanced channel coding and adaptive voice processing to improve reliability under constrained conditions. Together, these efforts signal a shift from basic access to more robust, scenario-adaptive connectivity.

Automotive direct-to-satellite is emerging as another priority. In February 2025, China Unicom and Geely's Geespace validated an end-to-end vehicle–satellite–platform link using an LEO constellation, pointing to future connected-vehicle and IoT use cases. In parallel, China Telecom has commercialised in-vehicle satellite solutions with multiple OEMs, currently supporting nine models and over 100,000 vehicles. These initiatives reflect early steps towards integrating NTNs into intelligent transport systems, enabling applications such as remote diagnostics, fleet management and emergency connectivity.

Satellite-supported IoT represents another key area of development. IoT applications, characterised by distributed, low-power devices and intermittent data transmission, require lower latency and more flexible coverage, so this is driving interest in LEO capabilities. In November 2025, the MIIT launched a two-year satellite IoT trial to validate terrestrial–satellite integration, device readiness and service models. China Unicom subsequently launched its Unicom Constellation (01–04), with satellites dedicated to LEO IoT communications and in-orbit validation, moving from consumer D2D towards scalable low-power connectivity. Meanwhile, In Taiwan, Rapidtek launched its next-generation IoT-capable LEO via SpaceX under the Taiwan Space Agency's CubeSat programme, enhancing payload capacity and application scope.

Collectively, these developments extend satellite connectivity from emergency back-up to broader use cases, across the industrial, agricultural, transport and energy sectors, among others, expanding the functional boundary of operator NTN services.

Deeper satellite and terrestrial network integration for full-service NTNs

As satellite connectivity extends across more devices and scenarios, the commercial focus in China is gradually shifting from access enablement to network integration. For NTNs to evolve beyond discrete satellite links, satellite systems need to operate as part of the wider mobile network, with coordinated core-network functions, service continuity, spectrum use, terminal compatibility and mobility management. This remains technically complex, particularly across GEO and LEO systems with different latency, coverage and handover characteristics. However, Chinese mobile operators are beginning to address these barriers through integrated architecture trials, 3GPP NTN alignment and planned multi-layer constellation deployments.

As early as 2024, China Mobile launched test satellites carrying onboard base-station and core-network payloads, completing early NR–NTN integration validation and reflecting initial efforts to explore space-based mobile network functions. In January 2026, filings from mainland China to the ITU included 14 constellation applications covering more than 200,000 satellites, including China Mobile's L1 (2,520 satellites) and M1 (144 satellites), as well as China Telecom's CHNTELESAT-MDTC (12 satellites).[9] The extent to which these planned constellations can deliver service-grade connectivity will eventually depend on the maturity of end-to-end integration across space and terrestrial networks. Ultimately, operators are positioning NTNs as part of a broader space–air–ground digital infrastructure layer, supporting ubiquitous connectivity for the low-altitude economy, industrial internet and emergency-resilience services.

9. "The three major telecom operators are building a satellite internet network", Securities Times, 2026

Other industry developments in China

6G	China's 6G development is shifting from early-stage research to system-level validation and industry coordination, with an increasing focus on candidate technology selection and early alignment with standardisation processes. National platforms such as Purple Mountain Laboratories have deployed multi-scenario field testbeds to validate integrated communication, sensing and AI capabilities. Operators, including China Mobile, China Telecom and China Unicom, are advancing 6G prototypes and cross-regional trials around distributed architectures, native AI and new spectrum such as terahertz.
Optical transmission	For optical transmission in China, there is a growing focus on a broader system upgrade for compute-centric networks, rather than just capacity upgrades. Huawei is advancing ultra-high-capacity all-optical transmission and AI data-centre interconnect solutions; ZTE is improving long-distance optical transport efficiency; and FiberHome and YOFC are strengthening the fibre and cable layer through ultra-low-loss fibre and new cable systems. China Mobile, China Telecom and China Unicom are upgrading the national backbone and metro networks while integrating all-optical networks with compute networks to support cross-regional compute scheduling. In Hong Kong and Taiwan, operators are expanding international subsea cable and metro optical capabilities to reinforce regional data hub positioning. Overall, optical transmission is becoming a key foundation for high-bandwidth, intelligent and compute-aware AI infrastructure.
Quantum technology	Quantum technology in China is being driven by research breakthroughs and early network deployment. Quantum communication is expanding through satellite-ground links and quantum key distribution networks. Meanwhile, Origin Quantum, a leading quantum computing company in mainland China, is advancing domestic quantum computers and cloud platforms. Operator participation is also increasing: China Telecom, China Mobile and China Unicom have launched pilots for quantum-encrypted private lines, secure calling, enterprise communications and industry private networks across finance, government, energy and critical infrastructure. This signals progress beyond laboratory validation, with a growing focus on hybrid quantum and traditional network services. Taiwan is also leveraging its semiconductor base to support quantum device development, control systems and chip testing.
Holographic technology	Holographic and XR technologies in China are starting to translate into immersive communications and industrial applications. Huawei and ZTE are advancing glasses-free, advanced 3D display and low-latency transmission, while BOE and Goertek are strengthening display modules and XR device components. China Unicom and China Mobile are using 5G-Advanced networks to test holographic communication, volumetric video, remote holographic meetings and immersive interaction, alongside cloud and edge-rendering models. Meanwhile, AIGC is lowering content production costs, supporting use cases in education, tourism and industrial collaboration. However, the high cost of content and devices, along with network requirements, means that holography remains an early commercial (and future 6G) application area.

03

Mobile industry impact

3.1
Mobile as green infrastructure

In 2025, Chinese operators started to concentrate on more integrated approaches to low-carbon network and compute infrastructure, rather than standalone energy-saving measures. Internal efforts centred on AI-enabled network energy management, more adaptive cloud and IT architectures, large-scale site modernisation and higher use of renewable electricity across networks and data centres.

Examples of operator actions and outcomes illustrate the scale and breadth of this shift:

- **China Mobile** procured over 5.5 TWh of green electricity and saved 15 TWh of electricity in 2025, with power usage effectiveness (PUE) across large and hyperscale data centres reduced to 1.285 (i.e. non-IT facility overheads were kept to around 28.5% of IT equipment energy use).[10]
- **China Telecom** increased green electricity use to 4.2 TWh (a 56% increase year on year), reduced emissions by more than 16 million tonnes and completed green upgrades across over 800 equipment rooms and 50,000 base stations.[11]
- **Chunghwa Telecom** reached 88.7 GWh of renewable electricity procurement and self-generation in 2025, equal to a 6.46% renewable energy ratio, and secured over 4.6 TWh of green electricity through long-term power purchase agreements.[12]
- **Taiwan Mobile** reached a 17% renewable energy ratio in 2025, exceeding its original 14% target,[13] and saved more than 18 GWh of electricity across base stations.[14] Its cloud data centres had already achieved 100% renewable energy use in 2024,[15] six years ahead of target, supporting lower-carbon cloud and AI computing services.
- **SmarTone** improved base-station energy efficiency by 25% through hardware and software modernisation, with AI-driven traffic-based power optimisation adding a further 11% gain.[16]

Network sharing remains a structural efficiency lever. China Telecom and China Unicom operate the world's largest shared 5G standalone (SA) network, alongside shared 4G RAN assets, limiting duplicated infrastructure deployment. China Unicom reports in its ESG summary for 2025 that the co-building and co-sharing model saves around 24 TWh of electricity and reduces emissions by more than 13 million tonnes annually. At the same time, operators are also using procurement scale to extend circularity and greener supply-chain practices.

A defining change in 2025 for Chinese operators was the deeper role of AI in energy management, which enabled predictive and real-time optimisation across networks, IT systems and data centres. Through greener infrastructure and smarter network and compute scheduling, operators are increasingly shaping the carbon intensity of digital workloads across other industries. Their role is expanding from reducing internal energy use to enabling lower-carbon digital services for enterprises and providing distributed flexibility that supports more efficient renewable integration across the power system.

10. China Mobile ESG Report 2025
11. China Telecom Annual Report 2025
12. Chunghwa Telecom Sustainability Report 2025
13. Taiwan Mobile Fourth Quarter Results 2025
14. Taiwan Mobile News Release, February 2026
15. "Taiwan Mobile achieves fifth consecutive CDP 'A' rating", Taiwan Mobile, February 2025
16. SmarTone ESG Report 2024/25

Green compute services to enable downstream enterprise decarbonisation

The rapid expansion of AI workloads and intelligent computing centres is becoming a major source of energy demand across the digital infrastructure of mobile operators in China. Decarbonising data-centre operations is therefore increasingly critical, both to meet tightening policy targets on energy efficiency and renewable use, and to reduce the carbon intensity of digital services consumed by enterprises.

Beyond direct green power procurement, geographic optimisation is an important lever for green compute sourcing. Under the 'Eastern Data, Western Computing' programme, operators are increasingly locating new large-scale data centres in regions with abundant renewable resources, allowing greater local consumption of wind and solar power. For example, China Mobile's Hohhot data centre achieved sustained 100% renewable electricity operation in 2025, alongside a PUE of around 1.2 and measurable cost and emissions reductions.[17] In parallel, 26 operator-run facilities have been designated as national green data centres,[18] reflecting compliance with stringent efficiency and renewable utilisation standards issued by the MIIT and other relevant departments.

Operators are also advancing AI-enabled cross-data-centre orchestration. China Telecom's Xirang platform, for example, enables unified scheduling across geographically distributed and heterogeneous compute resources, while its Yunting platform further links workload placement with power cost, PUE and renewable availability. By dynamically allocating suitable workloads to locations with more favourable power cost, efficiency and renewable availability, operators can improve overall utilisation and support greener compute delivery.

Together, geographic optimisation and intelligent scheduling allow operators to lower the embedded carbon footprint of computing services, extending decarbonisation benefits beyond their own operations to enterprise users.

Operators are becoming flexible renewable energy balancers

As Chinese operators deepen collaboration with energy providers and expand renewable integration across networks and data centres, their role is evolving beyond that of pure energy consumers. Supported by AI-enabled orchestration, operators are increasingly aligning compute demand with power availability, helping absorb excess renewable generation and mitigate intermittency. This reflects the emergence of a source–network–load–storage paradigm, where telecoms infrastructure acts as a flexible interface between digital workloads and energy systems.

During 2025–2026, this shift became more visible in China through large-scale green compute clusters designed around integrated energy-compute models. In Qinghai, operators have deployed data centres built to support coordinated power and compute systems. China Telecom's national green data centre within this model achieved 100% traceable clean energy supply.[19] These facilities are positioned to deliver low-carbon compute services to enterprise sectors.

At the same time, AI-driven workload orchestration enables more flexible allocation of compute demand, dynamically matching non-latency-critical workloads with locations offering more favourable energy conditions. These developments indicate a structural shift: Chinese operators are becoming grid-responsive participants, helping synchronise energy supply with digital demand while improving renewable energy utilisation.

17. "China Mobile's Hohhot Data Center achieved 100% green electricity operation in the first half of the year", Xinhua News Agency, July 2025
18. "60 selected! The list of National Green Data Centers for 2025 is released", CWW, October 2025
19. "How to build the most energy-efficient computing power?", Science and Technology Daily, October 2025

China Mobile Zhongwei: source–grid–load–storage project in Ningxia[20]

Challenge

China Mobile's Zhongwei facility forms part of a hyperscale data centre cluster within China's national computing hub in Ningxia, designed to handle non-latency-sensitive workloads from eastern regions. While the location offers abundant wind and solar resources, the intermittency of renewables creates a mismatch between power supply and continuous data-centre demand, limiting effective utilisation of local green energy.

Solution

In 2025, China Mobile Ningxia partnered with Datang Zhongwei New Energy to integrate large-scale renewable supply into the data-centre campus. The project is designed around 2 GW of renewable capacity under a source–grid–load–storage model, including 500 MW of solar power that has already been connected to the grid and 1.5 GW of wind power planned for subsequent integration. This structure links renewable generation, storage and data-centre demand, enabling the campus to absorb local green power more efficiently.

Impact

In its first year, the facility consumed 260 GWh of renewable electricity, reaching a 78% green energy share. The project reduces operating costs and emissions while improving local renewable utilisation, positioning Zhongwei as a key low-carbon compute hub under the 'Eastern Data, Western Computing' programme.

Distributed telecoms assets to support grid balancing and renewable utilisation

Beyond acting as cleaner-energy consumers, Chinese operators are exploring a more active role in energy systems. The virtual power plant model aggregates spare storage capacity and flexible loads from base stations, site-level photovoltaics, cooling systems and back-up power, enabling operators to reduce grid demand or discharge stored electricity back to the grid during peak periods. Although the power source involved may not necessarily be renewable, such flexibility shifts consumption away from carbon-intensive peak supply, improves system efficiency and supports higher renewables utilisation.

Early deployments are emerging. In Shenzhen, a virtual power plant initiative brought together China Tower and major operators to integrate base-station storage into grid coordination. By 2023, an initial 4,692 5G base stations had been connected, providing an estimated 15 MW of adjustable capacity for grid balancing.[21] In 2025, China Mobile Zhejiang was reported to have deployed 250 MWh of storage capacity, with 22 MW of controllable power, across 5,000 sites and aggregated 7,932 base stations into a 30 MW virtual power plant. Over two years, the project delivered more than 52 GWh of peak shaving and load shifting, generating CNY28.29 million in cumulative electricity cost savings and reducing emissions by around 30,000 tonnes.[22]

While still at an early stage, these developments point to a broader transition. Telecoms infrastructure is evolving from passive energy consumption towards active system participation, providing distributed flexibility that helps align power supply with digital demand and supports the wider decarbonisation of the energy system.

20. "Developing new productive forces in accordance with local conditions: How does Zhongwei, Ningxia, build itself into a 'green computing power capital'?", Xinhua News Agency, March 2026
21. "China's first 5G aggregation platform application center established", Seetao, June 2023
22. "Zhejiang Mobile innovatively creates virtual power plants in its communication networks to help save energy and reduce carbon emissions", People's Daily Online, December 2025

04

Policies for innovation and growth

China has been a driving force behind the use of the 6 GHz band. Following the identification for IMT at the World Radiocommunication Conference 2023 (WRC-23), 6 GHz is now the harmonised home for the expansion of mobile. It is the largest remaining single block of mid-band spectrum for mobile services and supports greater capacity. Since WRC-23, 6 GHz has continued to gather momentum around the world, with Hong Kong being the first to auction the band.

China is well positioned to further energise the mobile ecosystem through its focus on the 6 GHz band. On 8 May 2026, the MIIT approved the use of the 6 GHz band (6425–7125 MHz) for 6G technology trials. The move gives the industry a clearer platform for technical validation, standards preparation and ecosystem development. Meanwhile, further spectrum bands are being considered ahead of WRC-27, including 4.5 and 7 GHz, reinforcing the importance of a phased and internationally coordinated spectrum roadmap.

4.1
6 GHz secures the future for mobile evolution

With the development of 5G-Advanced, transformative applications are being unlocked across industries, driven by trends such as the rise of private networks and the wider adoption of 5G SA. China has been an early adopter and leader in this space. This new era will be spurred by AI, greater uplink performance, improved 5G RedCap and enhanced energy efficiency. However, none of this is possible without a constantly evolving and expanding spectrum strategy. Access to more mid-band spectrum will be particularly important, as the range has driven and will continue to drive most of mobile's socioeconomic benefits.

China has been a driving force behind the use of the 6 GHz band, which was identified for IMT at WRC-23. The identification of 6.425–7.125 GHz in Europe, the Middle East and Africa, and countries in Asia Pacific and the Americas, alongside the global harmonisation of technical and regulatory conditions for the band, was one of the important outcomes of WRC-23. Since then, countries have moved on to identify the band nationally, alongside early assignments to operators.

Illustrating the momentum behind the band, in 2024 Hong Kong became the first market in the world to conduct a spectrum auction of 6 GHz for mobile services. Despite the nascent 6 GHz ecosystem, the auction results mark one of the fastest developments of the IMT ecosystem for a new spectrum band and show operator confidence in the importance of 6 GHz for future mobile services. The first commercial connections are expected to be made using CPEs in 2026, with broad ecosystem deployment to follow in 2027 where the capacity is needed. After years of planning, 6 GHz is beginning to become part of the fabric of mobile connectivity.

China's early support for the upper 6 GHz band is increasingly aligned with wider regional momentum. Several Asia Pacific markets, including Bangladesh, Cambodia, India, Indonesia, Thailand and Vietnam, have added the band to their spectrum roadmap plans. For China, this wider alignment is important because it can strengthen ecosystem scale, improve equipment and device availability and support the role of 6 GHz as a future capacity layer for 5G-Advanced and 6G.

4.2
6G drives new spectrum demand

6G is expected to be deployed from around 2030, with large initial rollouts likely to occur in markets such as China, Japan, South Korea, the US, the Gulf Cooperation Council states, Europe, Vietnam and India. Some markets are already seeking to move earlier in the deployment cycle: South Korea has targeted initial 6G commercialisation from 2028, while China's approval of 6 GHz trial frequencies provides a stronger basis for pre-commercial research, technical validation and ecosystem coordination.

The number of 6G connections could reach more than 5 billion by 2040, representing approximately half of all mobile connections globally. The technology is expected to enable new and emerging use cases that could increase demand further in the 2030–2040 period, with much heavier uplink requirements. These include XR, image- and video-driven generative AI (genAI) and potentially holographic communication.

2 GHz of mid-band spectrum is required to be available by 2030 onwards, and 2–3 GHz (in all countries) or 2.5–4 GHz (in higher-demand countries) may be required during 2035–2040 to cope with the additional traffic demand. China sits towards the upper end of these global figures, requiring 2.6–3.7 GHz of spectrum by 2035–2040 to deliver high-traffic volumes to a predicted 1.6 billion 6G connections by 2040.[23]

The long timescale needed to deliver widespread harmonisation of spectrum means that government and regulatory planning is already happening for mobile in the 2030s. The upper 6 GHz band, which has already been widely harmonised and provides capacity for multiple channels over 200 MHz, is being considered as the next expansion band for mobile evolution in the widest number of countries.

WRC-27 will consider bands for the next phase of evolution, including the 4.5 and 7–8 GHz bands. However, as each of these bands have incumbent use, regulators and policymakers need to plan for increased mobile spectrum requirements now, considering the lead times required for international harmonisation, equipment development and network deployment.

Mobile broadband can deliver economic growth. As wireless connectivity expands from connecting the phones in our pockets to the machines in our factories or the vehicles on our roads, this potential requires spectrum to cater for demand.

23. Vision 2040 – Spectrum for the future of mobile connectivity, GSMA Intelligence, 2025

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